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WHAT IS CLAIMED IS:

1. A wireless LAN communication system having an infrastructure mode in which stations communicate with each other via an access point
5 and also having an ad-hoc mode in which communication is performed directly between stations located near each other, the wireless LAN communication system comprising:
 - an analyzer monitoring data transmitted from the source station to an access point and addressed, as a final destination, to one's own station in
10 the infrastructure mode, and detecting such data, in the destination station; - a controller being informed the above fact from the analyzer, determining that communication with the source station in the ad-hoc mode is possible, and notifying that communication is possible in the ad-hoc mode to the access point under communication, in the destination station;
15 a storage unit temporarily storing the data to prevent the data from being lost, in the destination station or the access point notified that communication is possible in the ad-hoc mode; - a searcher selecting and reserving one of available channels for use in communication in the ad-hoc mode, and transmitting a notice indicating the
20 selected channel to the source station of the data, in the destination station or the access point notified that communication is possible in the ad-hoc mode; and
each switching controller switching the communication mode into the ad-hoc mode using the selected channel, in the source and destination
25 stations respectively.
2. A wireless LAN communication system having an infrastructure mode in which stations communicate with each other via an access point and also having an ad-hoc mode in which communication is performed directly between stations located near each other, wherein each station

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comprises:

an analyzer monitoring data transmitted from the source station to an access point and addressed, as a final destination, to one's own station in the infrastructure mode, and detecting such data, in a case of a station

5 acting as a destination station;

a storage unit temporarily storing the data to prevent the data from being lost, in a case of a station acting as a destination station;

a searcher selecting and reserving one of available channels for use in communication in the ad-hoc mode, and transmits a notice indicating the
10 selected channel to the source station of the data, in a case of a station acting as a destination station;

a controller proposing to the source station via the access point that the communication mode should be switched into the ad-hoc mode using the selected channel, and, if the proposal is accepted, switching the
15 communication channel to the selected channel, in a case of a station acting as a destination station; and

the controller transmitting data to a destination station in the infrastructure mode, receiving a proposal from the destination station that the communication mode should be switched into the ad-hoc mode using the
20 selected channel, temporarily storing data to be transmitted, returning a response to indicate the acceptance of the proposal, and switching the communication channel to the selected channel, in a case of the station acting as a source station.

3. A wireless LAN communication system according to claim 2,
25 wherein the controller confirms that there is no communication to be performed with a station other than the destination station at the time when the station temporarily stores data to be transmitted as the source station.

4. A wireless LAN communication system according to claim 2,
wherein, when communication in the ad-hoc mode is to be ended,

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the controller transmits a request for switching the communication mode to the infrastructure mode to the destination station, and closes the communication channel in the ad-hoc mode if the request is accepted, in the case of the station acting as a transmitting station; and

5 the controller receives a request for switching the communication mode to the infrastructure mode from a source station, transmits an acceptance response to the source station and closes the communication channel in the ad-hoc mode, in the case of the station acting as a destination station.

10 5. A wireless LAN communication system according to claim 2, wherein

the station further comprises a detector for detecting degradation in communication condition to a level lower than a predetermined threshold;

15 the controller, in the receiving station, receives a notice indicating degradation in communication condition into a particular degraded state for a signal being received in the ad-hoc mode from the detector, transmits a request for switching the communication mode into the infrastructure mode to the transmitting station; and, when an acceptance response is received from the transmitting station, temporarily stores data to be transmitted;

20 the controller, in the transmitting station, receiving the request for switching the communication mode into the infrastructure mode from the receiving station, transmits an acceptance response to the receiving station, temporarily stores data to be transmitted; and

25 the controller, in both transmitting and receiving stations, switches the communication mode into the infrastructure mode by selecting a channel and accessing an access point via the selected channel in accordance with a normal procedure of switching to the infrastructure mode.

6. A wireless LAN communication system according to claim 5, wherein the degraded level in terms of the communication condition is a

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state in which the received signal level is lower than a predetermined threshold.

7. A wireless LAN communication system having an infrastructure mode in which stations communicate with each other via an access point
5 and also having an ad-hoc mode in which communication is performed directly between stations located near each other, wherein

the access point for transferring data in the infrastructure mode comprises:

- first data transmitter/receiver temporarily storing received data,
10 returning an acknowledge for the received data to a source station, transmitting the data to a destination station, and receiving an acknowledge from the destination station; and

- first controller, when the acknowledge is received before transmitting the temporarily stored data to the destination station, selecting an ad-hoc
15 communication channel and transmitting the temporarily stored data to the destination station, upon receiving an acknowledge in response to the transmitted data, proposing to the source station and the destination station that the channel should be switched into the ad-hoc communication channel, and, if the proposal is accepted, ending the transferring of data; and

- 20 each of the stations comprises:

second data transmitter/receiver, when data is received from the access point in the infrastructure mode, returning an acknowledge for the received data to the access point; and

- second controller monitoring and searching data transmitted from a
25 source station to an access point and addressed, as a final destination, to one's own station, detecting such data, transmitting an acknowledge for that data to the access point, and, when a proposal for switching the communication channel to an ad-hoc channel is received from the access point, returning an acknowledge for the proposal and switching the

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communication mode in the ad-hoc mode.

8. A wireless LAN communication system according to claim 7,
wherein the first controller confirms that there is no communication to be
performed with stations other than the source and destination stations, at a
5 time when the access point selects one of ad-hoc channels.

9. A wireless LAN communication system according to claim 7,
wherein, in a case that the access point receives, from a third station, data
addressed to one of stations being performing communication in the ad-hoc
mode,
10 the access points temporarily stores the received data, informs the
third station of an ad-hoc channel used by the destination station, and
returns the temporarily stored data; and

the third station, upon receiving the notice of the ad-hoc channel,
communicates with the destination station in the ad-hoc mode using the that
15 channel.

10. A wireless LAN communication system according to claim 7,
wherein

the second controller transmits a request for switching the
communication mode into the infrastructure mode to a destination station
20 when transmission of data in the ad-hoc mode is completed, and closes the
communication channel in the ad-hoc mode, in the case of the station acting
as a source station; and

the second controller transmits an acknowledge to the source station
when a request for switching the communication mode into the infrastructure
25 mode is received from a source station, and closes the communication
channel in the ad-hoc mode, in the case of the station acting as a destination
station.

11. A wireless LAN communication system according to claim 7,
wherein

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the access point further comprises a mode period storage unit for an infrastructure mode period and an ad-hoc mode period determined with reference to a timing of transmitting a beacon signal;

the first controller, upon selecting one of ad-hoc channels, transmits
5 period information stored in the mode period storage unit to a relating station, temporarily stores data addressed to the relating station and received from another station, transmits the temporarily stored data to the relating station when the communication mode is switched into the infrastructure mode in response to transmission of a beacon signal, temporarily stores data
10 transmitted from another station and arrived at the relating station being performing communication in the ad-hoc mode into which the communication mode is switched according to the period information, and transmits the beacon signal at predetermined intervals, repeatedly;

the second controller, upon receiving a proposal for switching the
15 communication mode from the access point, returns an acceptance response and switches the communication mode into the ad-hoc mode, after the ad-hoc mode period is ended according to the period information, waits for a beacon signal transmitted from the access point to arrive, switches the communication mode into the infrastructure mode in response to receiving
20 the beacon signal, informs the access point that the communication mode has been switched into the infrastructure mode, receives temporarily stored data from the access point, performs communication in the infrastructure mode and the ad-hoc mode during periods specified by the period information, waits for a next beacon signal to arrive, and performs the above
25 process in synchronization with beacon signals received at predetermined intervals, repeatedly.

12. A wireless LAN communication system according to claim 11, wherein a plurality of access points operate in synchronization with beacon signals in preparation for dealing with roaming and at a time when a mobile

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station moves from one access point to another access point:

- an access point, upon receiving a roaming request from the mobile station and acting as a destination access point to which the mobile station is to move to, responds to the roaming request from the mobile station,
- 5 transmits a transition notice to the access point with which the mobile station is currently connected, stores, in internal storage unit, temporarily stored data and mode period information received, as a response to the transition notice, from the access point with which the mobile station is currently connected, transmits a beacon signal with predetermined timing, and
- 10 transmits the temporarily stored data to the mobile station when the mobile station accesses the access point in the infrastructure mode;

- the access point, upon acting as an access point with which the mobile station is currently connected and receiving a transition notice from an access point to which the mobile station is to move, and transmits, as a
- 15 response to the transition notice, temporarily stored data and mode period information to the access point to which the mobile station is to move,

- the mobile station, in response to detection of occurrence of roaming condition in the infrastructure mode, transmits a roaming request to the access point to which the mobile station is to move, prepares for switching
- 20 the access point upon receiving a response to the roaming request, switches the communication mode into the infrastructure mode in response to receiving a beacon signal from the access point to which the mobile station is to move, starts accessing the access point to which the mobile station is to move, receives the temporarily stored data from the access point to which
- 25 the mobile station is to move, and starts communication.